FANCY PLOTS FOR SIG

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by

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Chapter 1

INTRODUCTION

The fancy plot package is a group of five programs which allow the user to make 2- and 3-dimensional document quality plots from the *SIG* data base. The fancyplot package was developed using a DEC VT100 terminal fitted with a Digital Engineering Retrographics board and the QMS Laserprinter. If a terminal emulates the VT100/Retrographic terminal the package should work. A Pericom terminal for example, works perfectly. The fancy plot package is available to provide report-ready plots without resorting to cutting and pasting. This package is contained in programs FFP, TFP, TDFD, 3DFFP and 3DTFP in directory ERD131::USER2_DISK:[HUDSON.SIG]. These programs may be summarized as follows:

FFP   - 2-dimensional **F**requency **F**ancy **P**lots with magnitude/phase option
TFP   - 2-dimensional **T**ime **F**ancy **P**lots
TDFD   - 2-dimensional **T**ime **D**omain **F**requency **D**omain plots
3DFFP - equally spaced **3-D**imensional **F**requency **F**ancy **P**lots
3DTFP - equally spaced **3-D**imensional **T**ime **P**lots

I. The 2-D plot packages (*FFP*, *TFP*, and *TDFD*) have the following capabilities:

  A. Separate user-defined Time/Frequency X- and Y-axis labels with variable size, fonts, superscripts, subscripts, and position.

  B. A separate user-defined title for each domain with variable size, fonts, superscripts, subscripts, position, and also partial autosizing.

  C. Automatically generate a legend for family plots.
     1. If legend label is blank, no legend is generated for that label.

  D. Automatically log the node/device/directory of the data stores used for plots.

  E. Give the user control of thickness, location and frame type.

  F. Produce an LLNL logo which tracks the plot size and has variable size.

  G. Allow the user to autoscale both X- and Y-axis with the engineering units.

  H. Plot with up to 11 different symbols with adjustable size and spacing and blanking or fill.

  I. Ten line types with varying thickness.
     1. Thick lines are plotted on the laserprinter with the different line types.

  J. Place user-generated figures (icons) onto plot surfaces.
     1. A drafting utility is provided to create figures (icons).
     2. Figures are positioned using cross-hairs or a light pen *(for VT100 with Retrographics)*

  K. Spool the existing screen plot to the laserprinter during the plot pause.

L. Plot a time domain and frequency domain plot on the same page. (TDFD)

M. Provide a plot shading capability.

II. The 3-D plot packages *3DTFP* (Time) and *3DFFP* (Frequency) have the following cababilities:

A. Assumes equal spacing along Z-axis.

B. Draw a series of lines or a surface with ± data

C. Plot using hidden lines.

D. Same capability for font changes as the 2-D plot packages.

E. Draw thick borders and lines.

F. Align axis numbers and labels with axis orientation.

Examples of the plots produced by FFP are shown in Figure 1-1 through Figure 1-2. Figure 1-1 shows a plot produced by the program *FFP* in the viewgraph mode. When the appropriate flag is set a plot, shown in Figure 1-2, is created that will display the magnitude and phase or real and imaginary plots on the same page.

Figure 1-3 shows a time domain plot produced by *TFP*. Sometimes it is convenient to display a time domain and corresponding frequency domain plot on the same page. *TDFD* does this as is shown in Figure 1-4.

When three-dimensional plots are needed, *3DFFP* and *3DTFP* can provide them as in Figure 1-5 and Figure 1-6. The plots displayed in these figures show the same data set plotted using four different hidden line options.

Sample of Viewgraph Plot
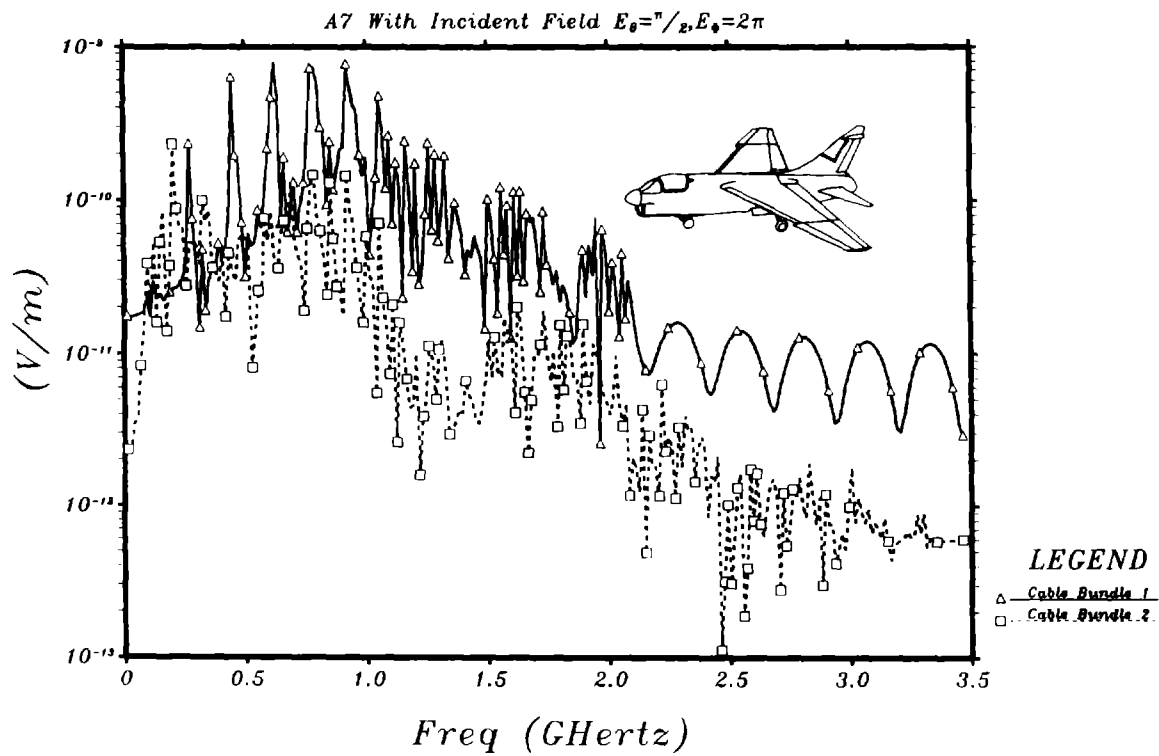
Figure 1-1   Sample plot produced by FFP.

Aperture Coupling
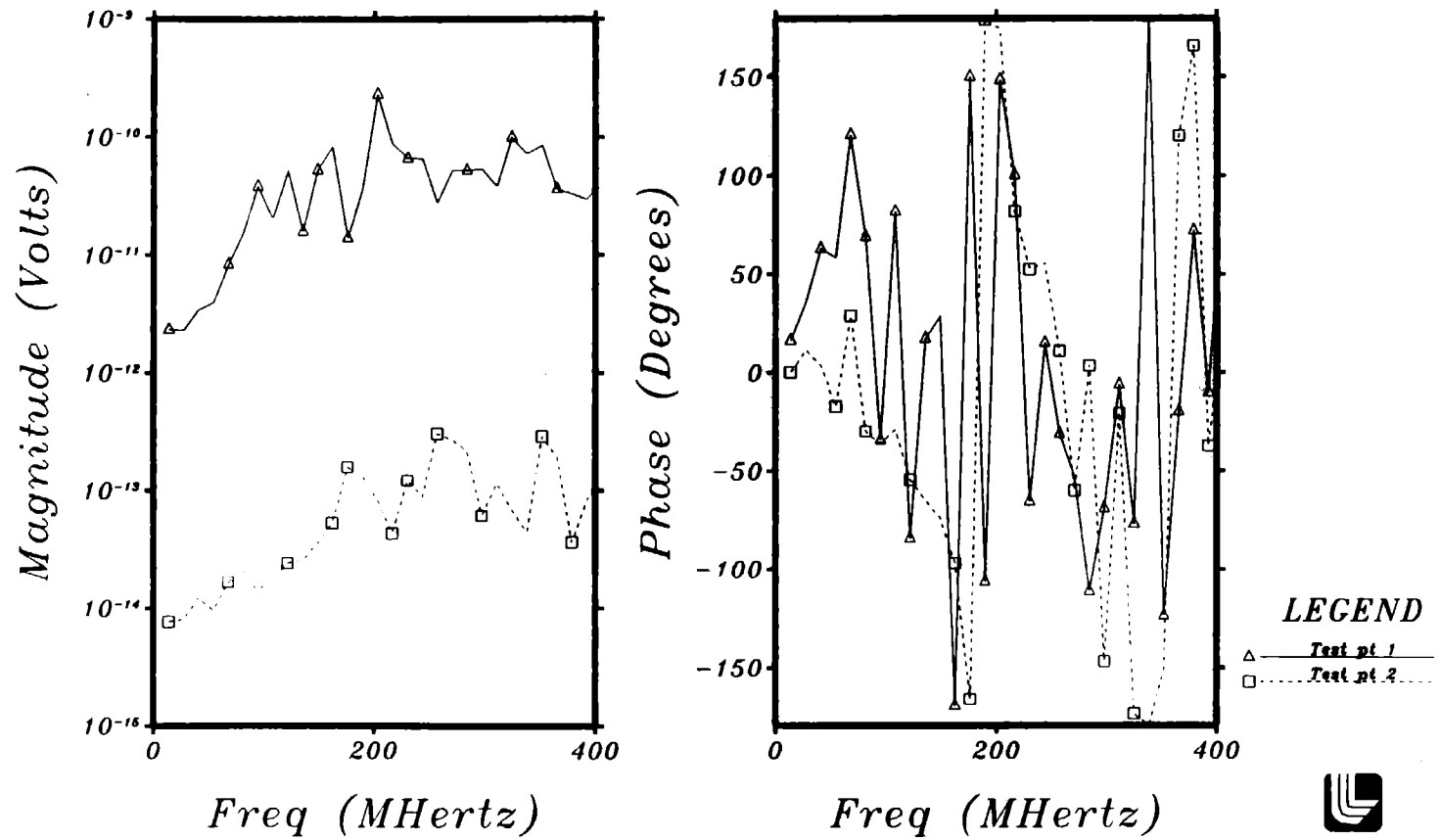
Figure 1-2   Sample dual plot produced by FFP.
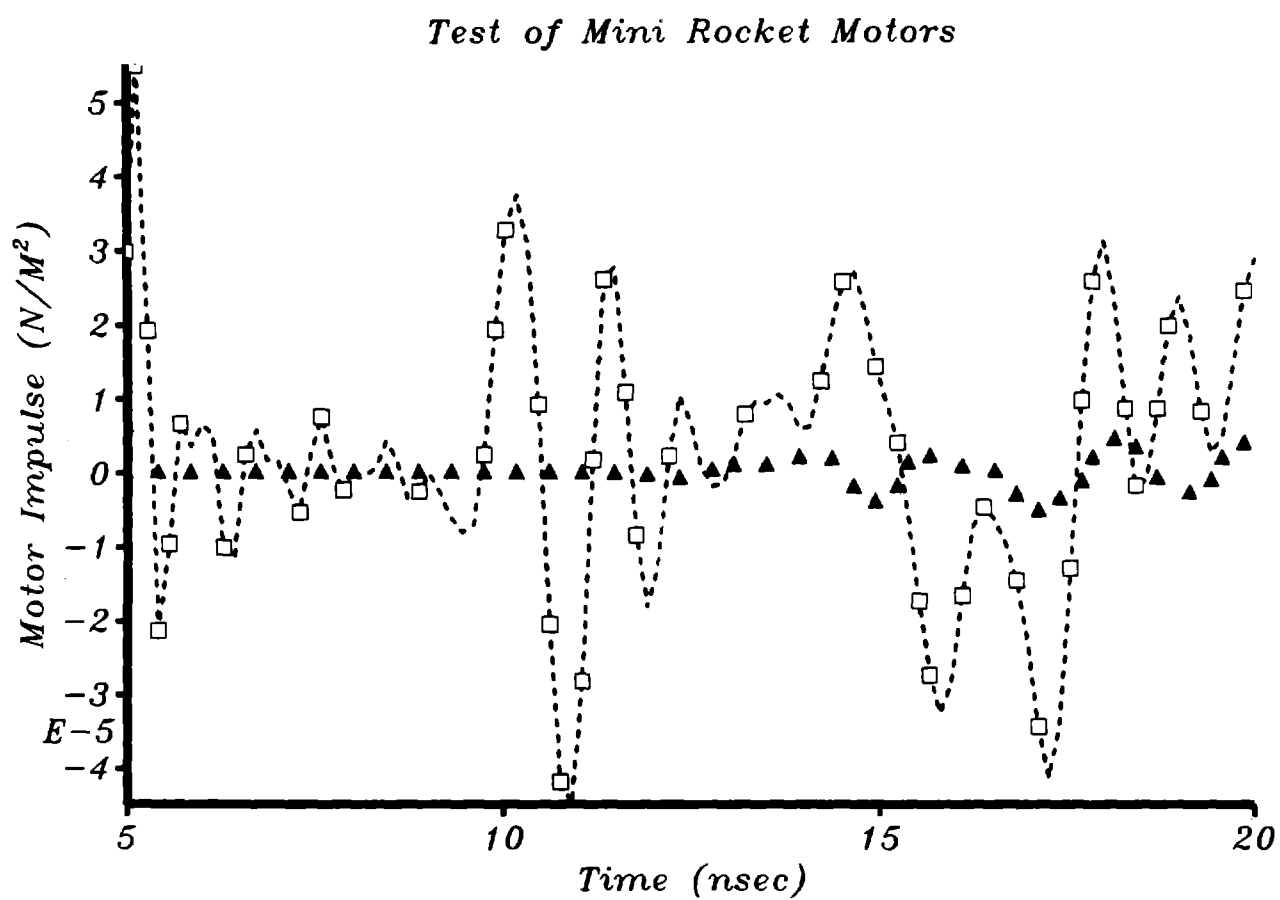
Figure 1-3   Sample plot produced by TFP.
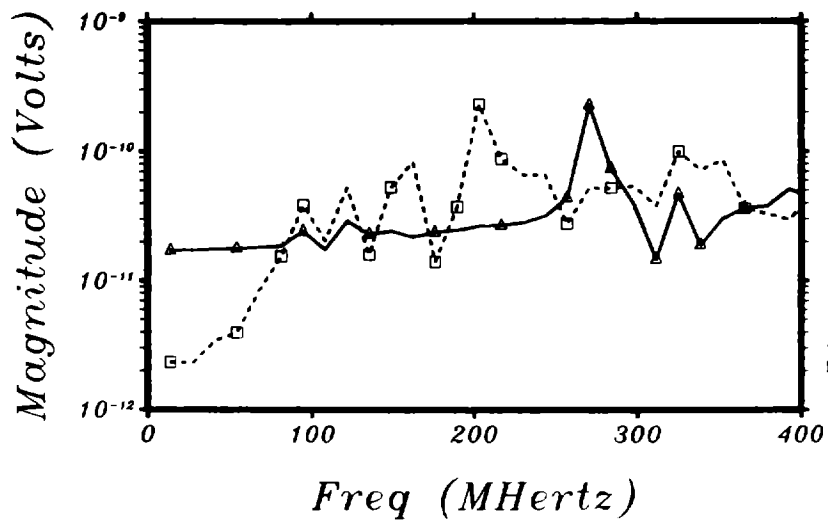
Figure 1-4   Sample plot produced by TDFD.
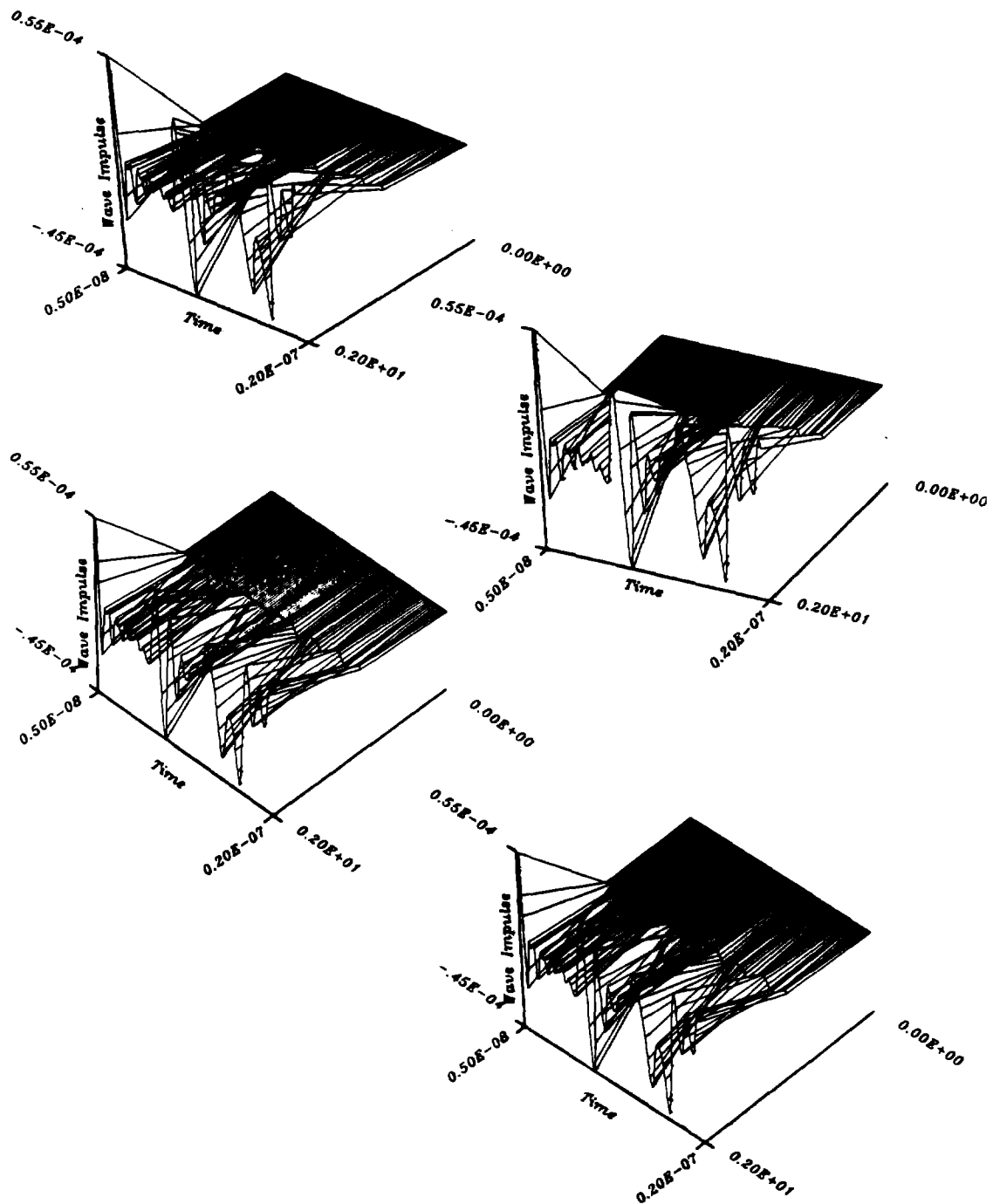
Figure 1-5   Sample plots produced by 3DTFP.
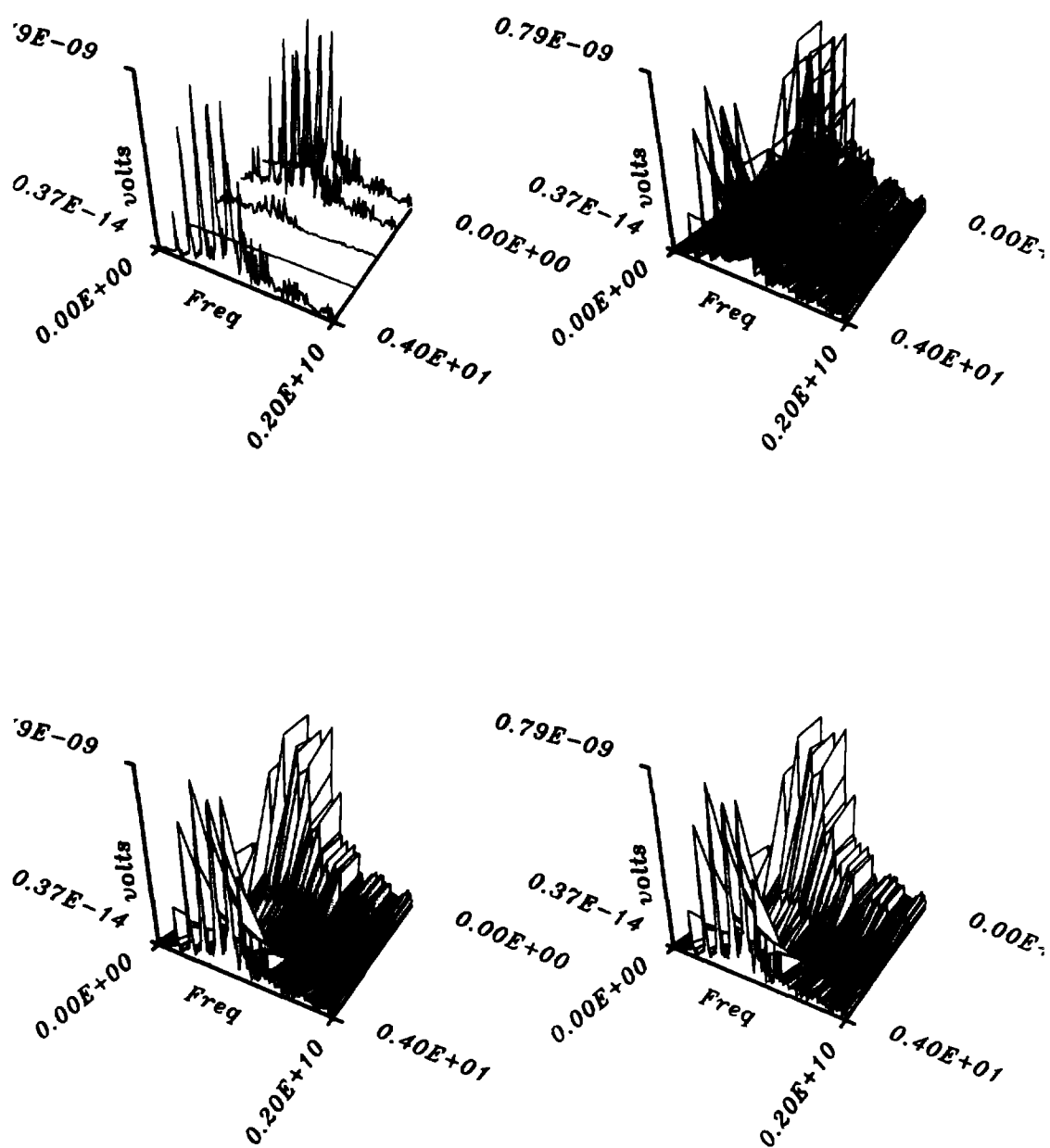
Figure 1-6   Sample plots produced by 3DFFP.

Chapter 2

INSTALLATION OF FANCY PLOT PROGRAMS

The following instructions assume that the following executable programs are resident on your computer: TFP, FFP, TDFD, 3DTFP and 3DFFP. If the plot programs are not available and your VAX is running VMS Version 4 the executables can be copied from ERD131::USER2_DISK[HUDSON.SIG].

1. Copy DEFINITIONS.SCF, 3DIMFREQ.MNU, 3DIMTIME.MNU, BORDER.MNU, CURVES.MNU, DRAFT.MNU, FANCY.MNU, FFP.MNU, LEGEND.MNU, PLOTF.MNU, SHADE.MNU, TDFD.MNU, TFP.MNU from ERD131::USER2_DISK:[HUDSON.SIG] into your main directory.

2. Edit DEFINITIONS.SCF to change all occurances of the resident directory location on the ERD131 VAX USER2_DISK:[HUDSON.SIG] to the directory location of the plot programs on your machine.

3. Enter *SIG* and type EXE DEFINITIONS in response to the *SIG* prompt 'SIG>'. (This takes a while to execute so relax.)

At this point, your local *SIG* parameter file will have been created. Leave this in your main directory. When making a new *SIG* data base or using an existing one, use the PFCOPY command to copy the *SIG* parameter file from your main directory. This method of propagating all of the new commands to new databases is much faster than executing the DEFINITIONS command file for each new data base.

4. Go to a directory containing a SIG database and copy all the '.mnu' files from your main directory into the local directory where the SIG database is resident.

5. Now find an FS or TS data store, and type FFP ds#, or TFP ds# and your data should be plotted.

6. The plot will now stop at the plot pause menu. At this point type '1' to continue.

7. Now type MENU PLOTF. This will place you into the main fancy plot menu, from which all the commands may be accessed. These menus, which show the scope of commands used, are seen in Figure 2-1 through Figure 2-11.

FANCY PLOT MENU OPTIONS

1) Go to menu TFP   2) Go to menu FFP   3) Go to menu TDFD
4) Go to menu BORDER   5) Go to menu CURVES   6) Go to menu LEGEND
7) Go to menu SHADING   8) Go to menu DRAFTING 9) Go to menu 3-D(Time)
10) Go to menu 3-D(Freq)

------------ GENERAL PLOTTING CHARACTERISTICS ------------

11) Header (yes/no):   yes
12) Viewgraph Mode (yes/no):   no
13) Viewgraph Title: Sample of a Viewgraph Plot
14) Number of Viewports [MUST BE 1]   1
15) Plotting Mode (Family/Single):   FAMILY
16) Lasersave (space/filename):
17) Title Characteristics (size font):   0.5 4
18) Title Shift in cm (x-shift y-shift):   0.0 0.0
19) LLLlogo (yes=1/no=0):   1
20) LLLlogo size (in cm):   0.52

Menu item? (0=redisplay, CTRL-Z=return to SIG)>

Figure 2-1   General Fancy Plot Characteristics Menu

Fancy Time Domain Plot Parameter Menu

1) Return to Menu PLOTF
2) Do a Fancy Time Spectrum Plot
3) Frequency Family Title: Time Family Title
4) X-axis Label: Time
5) X-axis Units: nsec
6) Y-axis Label: Incident Field
7) Y-axis Units: Volts/meter

8) Xmin: 0   9) Xmax: 0
10) Ymin: 0   11) Ymax: 0

Menu item? (0=redisplay, CTRL-Z=return to SIG)>

Figure 2-2   Fancy Time Domain Plot Parameter Menu

```
Fancy Frequency Domain Plot Parameter Menu

   1) Return to Menu PLOTF
   2) Do a Fancy Frequency Spectrum Plot
   3) Split Frequency Plot (yest/yesw/no) :          no
   4) Plot type (RE,IM,Mag,etc.):                    mag
   5) Plot type B for Split plot (RE,IM,MAG,etc.):   pha
   6) Frequency Family Title:  Frequency Response
   7) X-axis Label:            Frequency
   8) X-axis Units:            Hz
   9) Y-axis Label:            Magnitude (Volts)
  10) Y-axis Units:            Yunits
  11) Y-axis Label B:          Phase (Degrees)
  12) Y-axis Units B:          2nd Yunits


  13) Xmin:   0                14) Xmax:    0
  15) Ymin:   0                16) Ymax:    0
  17) Yminb:  0                18) Ymaxb:   0
  19) B Y-type (LIN or LOG):                0

Menu item? (0=redisplay, CTRL-Z=return to SIG)>
```

Figure 2-3   Fancy Frequency Domain Plot Parameter Menu

```
       TDFD- TIME & FREQUENCY SPLIT PLOT MENU

   1) Return to Menu PLOTF
   2) Do a TDFD Plot
   3) Viewport (tall/wide):   tall
   4) Frequency Family Title: Family Plots
   5) X-axis Label (Time):    Time
   6) X-axis Units (Time):    nsec
   7) Y-axis Label (Time):    Incident Field
   8) Y-axis Units (Time):    Volts/meter
   9) X-axis Label (Freq):    Frequency
  10) X-axis Units (Freq):    Hz
  11) Y-axis Label (Freq):    Incident Field
  12) Y-axis Units (Freq):    Volts/meter/Hz

  13) Xmint: 0    14) Xmaxt: 0    15) Xminf: 0    16) Xmaxf: 10e7
  17) Ymint: 0    18) Ymaxt: 0    19) Yminf: 0    20) Ymaxf: 0

Menu item? (0=redisplay, CTRL-Z=return to SIG)>
```

Figure 2-4   Time and Frequency Domain Plot Menu

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BORDER CHARACTERISTICS

1) Return to Menu PLOTF
2) Viewport Size in percentage (xmin xmax ymin ymax):   0.1 1.0 0.2 0.9
3) Border Char.   R-border [yes=1/no=0]
                   T-border [yes=1/no=0]
                   line thickness: 1 1 10
4) Axis Number Char. (size font):   0.3 4
5) X-Axis Engineering Units (Yes/No):   yes
6) Y-Axis Engineering Units (Yes/No):   no

        ---------- AXIS LABEL CHARACTERISTICS -----------

7) X-Axis Label Char. (size font):   0.5 4
8) X-Axis Label Displacement in cm (x y):   0.0 0.0
9) Y-Axis Label Char. (size font):   0.5 4
10) Y-Axis Label Displacement in cm (x y):   0.0 0.0

Menu item? (0=redisplay, CTRL-Z=return to SIG)>

Figure 2-5   Border Characteristics Menu

CURVE PLOTTING CHARACTERISTICS MENU

1) Return to Menu PLOTF
2) Auto-line Sequencing (Yes=1/No=0):   1
3) Auto-symbol Sequencing (Yes=1/No=0):   0
4) Auto-symbol Spacing Sequencing (Yes=1/No=0): 1
5) Singleplot Char. (L-type Sym-type Sym-spacing):   1 0 1.0
6) Line width: 3
7) Linetype - First 5 curves: 1 2 3 4 5
8) Linetype - Second 5 curves: 6 7 8 9 10
9) Symboltype - First 5 curves: 1 2 3 4 5
10) Symboltype - Second 5 curves: 6 7 8 9 10
11) Symbol Spacing - First 5 curves: 1.0 1.0 1.0 1.0 1.0
12) Symbol Spacing - Second 5 curves: 1.0 1.0 1.0 1.0 1.0
13) Symbol Size in cm: 0.2
14) Symbol Blanking (Yes=1/No=0):   0

Menu item? (0=redisplay, CTRL-Z=return to SIG)>

Figure 2-6   Curve Plotting Characteristics Menu

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```
LEGEND MENU

   1) Return to menu PLOTF
   2) Legend (Yes/No):                    no
   3) Legend Displacement in cm (x,y):    0,0
   4) Legend Font:                        4


           ----------  LEGEND LABELS  ----------

   5) legend title 1:                     Test pt 1
   6) legend title 2:                     Test pt 2
   7) legend title 3:                     Test pt 3
   8) legend title 4:                     Test pt 4
   9) legend title 5:                     Legend 5
  10) legend title 6:                     Legend 6
  11) legend title 7:                     Legend 7
  12) legend title 8:                     Legend 8
  13) legend title 9:                     Legend 9
  14) legend title 10:                    Legend 10

Menu item? (0=redisplay, CTRL-Z=return to SIG)>
```

Figure 2-7   Fancy Plot Legend Menu

```
           SHADING CHARACTERISTICS MENU

OPTION FORMAT  [Off=0/Under=1/Over=2,Shading Slant (Deg),Line
               Separation (cm)]

   1) Return to Menu PLOTF

   2) Plot 1 Shading:        1,120,0.5
   3) Plot 2 Shading:        1,120,0.5
   4) Plot 3 Shading:        0,0,0.4
   5) Plot 4 Shading:        0,0,0.4
   6) plot 5 Shading:        0,0,0.4

Menu item? (0=redisplay, CTRL-Z=return to SIG)>
```

Figure 2-8   Shading Characteristics Menu

```
DRAFTING MENU

                    1) Return to Menu PLOTF

-------------- Drafting files currently positioned:   --------------

                    2) Icon1 :
                    3) Icon2 :
                    4) Icon3 :
                    5) Icon4 :
                    6) Icon5 :

----------------- Location of drafting icons:   -----------------

             7) Icon1 Position: 0.8, 0.8, 0.1
             8) Icon2 Position: 0.8, 0.7, 0.1
             9) Icon3 Position: 0.8, 0.6, 0.1
            10) Icon4 Position: 0.8, 0.5, 0.1
            11) Icon5 Position: 0.8, 0.4, 0.1

Menu item? (O=redisplay, CTRL-Z=return to SIG)>
```

Figure 2-9   Drafting Menu

3-Dimensional Time Domain Parameter Menu

```
      1) Return to Menu PLOTF
      2) Do a 3-D Time Domain Spectrum Plot
      3) 3-D char. (Zdist,Yrot,Xrot,options,L-blank):   3 30 30 1 1
      4) Time Family Title: Time Family Title
      5) X-axis Label:        Time
      6) X-axis Units:        nsec
      7) Y-axis Label:        Impulse
      8) Y-axis Units:        N/M{p/2}
      9) Z-axis Label:        Time Zlabel
     10) Z-axis Units:         Zunits
     11) Xmin:    O           12) Xmax       O
     13) Ymin:    O           14) Ymax:      O

Menu item? (O=redisplay, CTRL-Z=return to SIG)>
```

Figure 2-10   3-Dimensional Time Domain Parameter Menu

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3-Dimensional Frequency Domain Parameter Menu

```
        1) Return to Menu PLOTF
2) Do a 3-D Frequency Spectrum Plot
        3) 3-D char. (Zdist,Yrot,Xrot,options,L-blank):  3 30 30 1 1
4) Frequency Family Title: Frequency Title

5) X-axis Label:           Frequency
6) X-axis Units:           Hz
7) Y-axis Label:           Magnitude (Volts)
8) Y-axis Units:           Yunits
9) Z-axis Label:           Frequency Zlabel
10) Z-axis Units:          Zunits


        11) Xmin:   0               12) Xmax:    10e7
13) Ymin:   0              14) Ymax:    0

Menu item? (0=redisplay, CTRL-Z=return to SIG)>
```

Figure 2-11   3-Dimensional Time Domain Parameter Menu

Chapter 3

FANCY PLOT COMMANDS AND CAPABILITIES

The fancy plot package uses the SIG parameter file to determine how the plot is presented. New parameter keys have been added to the SIG parameter file and contains information on plot size, line types used, symbol types used, legends, logos, etc. These keys and which of the fancyplot programs utilize them are listed in Appendix B. There are currently ten different line types and fonts and eleven different symbols available to the user. These are shown in Table 3-1 and Table 3-2.

```
Font  1:  @#%^[ ]< >\ I ~ `    This is font 1.
Font  2:  @#%^[ ] <>\  ~ '     This is font 2.
Font  3:  °        ' '         This is font 3.
Font  4:  °        ' '         This is font 4.
Font  5:  ° #  ^ ' '   → |     This is font 5.
Font  6:  °        ' '         This is font 6.
Font  7:  °        ' '         This is font 7.
Font  8:  Greek and Math; see equivalances below.
Font  9:  °        ' '         This is font 9.
Font 10:  °        ' '   T ß    This if font 10.
```

ASCII	ABCDEFGHIJKLMNOPQRSTUVWXYZ
Greek	ABΓΔEΘ⊕HIϕKΛMNOPΠΞΣTΦΤΩXΨZ
ASCII	abcdefghijklmnopqrstuvwxyz
Greek	αβγδεϕϑηιʃκλμνορπξστφυωχψζ
ASCII	! @#$%^; : ? "\ `
Greek	‖ ≡ ≦ ≧ ∝ ↑∞∃≠√→↓

Table 3-1   Fonts used in Fancy Plot

	Symbol	Line		Symbol
1	△	—————	−1	▲
2	□	·············	−2	■
3	◇	··················	−3	◆
4	⊠	— — — — — —	−4	✗
5	○	— - — - — - — ·	−5	●
6	✛	····· ··········· ·	−6	✦
7	×	– – – – – – – –	−7	✗
8	▽	— ·· — ···· — —	−8	▼
9	⊠	— — — — — —	−9	◪
10	✳	(Blank)	−10	✳
11	I		−11	I

Table 3-2   Symbol and Line types used in Fancyplot.

The fancy plot program also allows the user to place predefined figures on the plots. These figures are developed from vector files defined utilzing the *ICON* command. The vector commands are explained in Chapter 4. This drafting package is very flexible and allows the user to place figures corresponding to the given plot on that plot.

This plotting program allows characters to be subscripted or superscripted. The text cursor can be backspaced and alternate character sets from the default font. Although there are 10 character fonts, only fonts one through nine can be used as subscripts, superscripts, or alternate character fonts. These subscripts, superscripts, and alternate character fonts can be selected by enclosing the corresponding character within special symbols, e.g. *This is x{P/2}* produces *This is x^2*. The special symbols indicate that the material within is a backspace command, an alternate character set, or sub- or superscript. The backspace command is "$<n$" where n is the number of spaces to be backed up. Subscripts are indicated by "*B/*" , sub-subscripts by "*_/*", superscript by "*P/*", and super-superscripts by "*^/*". The developed string can be examined for correctness by executing [HUDSON.SIG]PARSER. The generic form for the parser and some examples are shown in Figure 3-1 below.

$$\text{TEXT } \{(\text{font-}\#)(\text{scripter})/\text{item to be altered}\} \text{ TEXT}$$

$$\{8/s\}\{P/2\} \text{ test} \rightarrow \sigma^2 \text{ test}$$
$$V\{P/2\}\{<1\}\{B/L\} \rightarrow V_L^2$$
$$I\{8P/s\} \rightarrow I^\sigma$$

Figure 3-1   Parser samples

SIG Common Commands available:

DOMAIN
FAMILY
FZERO
GRID   (Full/Tick)
LINAMP
LINAMPT
LINFREQ
LINTIME
LOGAMP
LOGAMPT
LOGFREQ
LOGTIME
PAWS   (Every/Page/Never)
PLTYPE   (Real/Imag/Mag/Phase)
SINGLE
TLASER
VPORTS
VT100
WLASER

Fancy plot parameter commands:

AXISCHAR   (axis# size,axis#font)
AUTOLINE   (1=Yes,0=No)
AUTOSPACE   (1=Yes,0=No)
AUTOSYMBOL   (1=Yes,0=No)

BORDER   (p1 p2 p3)
HEADER   (Yes/No)
LASERSAV   (1=Yes,0=no)
LINETYPEA   (p1 p2 p3 p4 p5)
LINETYPEB   (p1 p2 p3 p4 p5)
LINEWIDTH   (1,2,3,4,5,6...)
LOGO   (1=Yes,0=no)
LOGOSIZE   (
SHADE   (p1 p2 p3)
SINGLEPLOT   (p1 p2 p3)
SYMA   (p1 p2 p3 p4 p5)
SYMB   (p1 p2 p3 p4 p5)
SYMBLANK   (1=Yes,0=No)
SYMBOLSIZE
SYMSPA   (p1 p2 p3 p4 p5)
SYMSPB   (p1 p2 p3 p4 p5)
TICKEND   (Yes/No)
VIEWMOD   (Yes/No)
VPORTSIZE   (p1 p2 p3 p4)
3DCHAR   (p1 p2 p3 p4 p5)

Fancy title Commands:

TITLECHAR   (size,font)
TITLEF   (title)
TITLESHF $\Delta x, \Delta y$
TITLET   (title)
VTITLE   (title)
XAUTO   (Yes/No)
XLABCHAR   (size,font)
XLABF   (label)
XLABSHF $\Delta x, \Delta y$
XLABT   (label)
XUNITSF   (unit)
XUNITST   (unit)
YAUTO   (Yes/No)
YLABCHAR   (size,font)
YLABF   (label)
YLABT   (label)
YUNITSF   (unit)
YUNITST   (unit)
ZLABF   (label)
ZLABT   (label)
ZUNITSF   (unit)
ZUNITST   (unit)

Plot Limit Minimums and Maximums:

```
XMAXF   (number)
XMAXT   (number)
XMINF   (number)
XMINT   (number)
YMAXF   (number)
YMAXT   (number)
YMINF   (number)
YMINT   (number)
```

Split plot commands:

```
PLTYPEB   (Real/Imag/Mag/Phase)
SPLITFF   (YesT,YesW,No)
SPLITTF   (Tall/Wide)
YLABFB    (label
YMAXFB    (number)
YMINFB    (number)
YTYPEB    (Lin/Log)
YUNITSFB  (unit)
```

Legend commands:

```
LEGDT     Δx, Δy
LEGEND    (Yes/No)
LEGFONT   (font #)
LEG1      (legend text)
LEG2      (legend text)
LEG3      (legend text)
LEG4      (legend text)
LEG5      (legend text)
LEG6      (legend text)
LEG7      (legend text)
LEG8      (legend text)
LEG9      (legend text)
LEG10     (legend text)
```

Drafting Commands:

```
ICON1     (draftfilename)
ICON2     (draftfilename)
ICON3     (draftfilename)
ICON4     (draftfilename)
ICON5     (draftfilename)
ICONPOS1  (x%, y%, size)
ICONPOS2  (x%, y%, size)
ICONPOS3  (x%, y%, size)
ICONPOS4  (x%, y%, size)
ICONPOS5  (x%, y%, size)
```

Alphabetical Listing of Fancy Plot Commands:

AXISCHAR   (axis # size, axis # font) - Sets the size and font (see Table 3-1) of the numbers that label the x and y axis.

AUTOLINE   (1=yes, 0=no) When enabled will cycle through different line types as defined by the LINETYPEA and LINETYPEB parameters. When disabled the curves in a family plot will default to the linetype defined by the SINGLEPLOT parameter.

AUTOSYMBOL   (1=yes, 0=no) When enabled will cycle through different symbol types as defined by the SYMA and SYMB parameters. When disabled the curves in a family plot will default to the symbol type defined by the SINGLEPLOT parameter.

AUTOSPACE   (1=yes, 0=no) When enabled will cycle through different symbol spacing as defined by the SYMSPA and SYMSPB parameters. When disabled the curves in a family plot will default to the symbol spacing defined by the SINGLEPLOT parameter.

BORDER   (Rt. Border(1/0), Top Border(1/0), Border Thickness (number)) - Sets the plot border characteristics. For example with the BORDER parameter set as 0 0 1 disables the right and top borders of the plot and gives the border the minimum thickness of 1. If BORDER is set to 1 1 5 then the plot border will now have both top and right borders and their thickness will be five times the thickness of the first example. Use of this parameter has a great effect on the plot appearance.

DOMAIN   (Continuous/Discrete) - sets the domain type.

FAMILY   - This command tells the program to do family plots. This is also necessary to enable the legend and to use the family titles (see TITLEF and TITLET) instead of the individual data store numbers and titles.

FZERO   (Yes/No) - This command tells the program to plot the DC data component.

GRID   (Full/Tick) - This command selects the grid type for each plot.

HEADER   (Yes/No) - This command tells the program whether or not to place the documentation information concerning user node/date, and data stores plotted at the top of the plot. In viewgraph mode (see VIEW-MOD), the header is disabled.

ICON1   (filename) -Sets the program to place icon 1 on the figure plotted. If no icon is desired, place a ' ' into the parameter. Thus, to place a created figure on a plot, first create it using *DRAFTTEST* (see drafting section). Then type ICON1 'filename'. Then place *SIG* into the plot pause mode, and plot your data stores. Your desired figure will have been placed in a default location, so you then position it with the cross hairs as asked by the pause menu. The program will then save this location for the next time you plot a figure. To remove the figure, type ICON1 followed by a blank with quotes (i.e. ICON1 ' ').

ICON2   'see ICON1'

ICON3	'see ICON1'
ICON4	'see ICON1'
ICON5	'see ICON1'
ICONPOS1	(x %, y%, size) This command enables the user to change the position of the first ICON (defined by the ICON1 command) without using the cursors. This command would be used mainly in a command file when plots were being generated in a batch job and the user interaction with the cursors is not possible.
ICONPOS2	'see ICONPOS1'
ICONPOS3	'see ICONPOS1'
ICONPOS4	'see ICONPOS1'
ICONPOS5	'see ICONPOS1'
LASERSAV	(blank or filename) When a blank ' ' is inserted in this parameter then plots are sent to the laserprinter as is the normal case. When a filename is inserted then the plot file generated by SIG is **not** automatically sent to the laserprinter but written into the file specified by 'filename'.
LINEWIDTH	(number 0 - 9) - Sets the line thickness used to plot the data. This parameter sets the thickness for all curves on a family plot.
LOGO	(1=yes, 0=no) - When enabled plots the LLL logo.
LOGOSIZE	(number) - Sets the size of the LLL logo a good default size is 0.52.
LEGDT	($\Delta x, \Delta y$ in cm) - Moves the legend from its default position. A negative Δx moves the legend to the left on the plotting surface. A negative Δy moves the legend towards the bottom of the plotting surface.
LEGEND	(Yes/No) - Turns the family plot legend on or off.
LEGFONT	(Integer 1-10) - Sets the font used for the family plot legend as defined in Table 3-1.
LEG1	(legend) - Sets the legend #1 used by the family plot when the legend is on. It is limited to 15 characters. If a "~" is placed in the legend, no title or line is printed for that line. This feature is useful if a reference line is plotted to add clarity but no legend reference is wanted and this must be the last defined legend(s).
LEG2	'see LEG1'
LEG3	'see LEG1'
LEG4	'see LEG1'
LEG5	'see LEG1'
LEG6	'see LEG1'
LEG7	'see LEG1'
LEG8	'see LEG1'
LEG9	'see LEG1'
LEG10	'see LEG1'
LINAMP	- Sets the Y-axis for frequency domain plots to linear scale.
LINAMPT	- Sets the Y-axis for time domain plots to linear scale.

LINETYPEA	(integer 1-10) -This parameter is activated when the AUTOLINE parameter is set to 1. LINETYPEA sets the order for the linetypes for curves 1 to 5 in a family plot i.e. 1 3 5 7 9. Using this example a family plot would use linetype 1 for the first curve linetype 3 for the second curve etc.
LINETYPEB	(integer 1-10) -Sets the order for the linetypes for curves 6 to 10 in a family plot i.e. 2 4 1 3 8. In this example the sixth curve in the family plot would use linetype 2 the eighth curve would use linetype 1. The line types do not have to be all different, used in conjunction with the symbol commands some lines could also have symbols or with a linetype of '10' one can have symbols only.
LINFREQ	- Sets the X-axis for frequency domain plots to linear scale.
LINTIME	- Sets the X-axis for time domain plots to linear scale.
LOGAMP	- Sets the Y-axis for frequency domain plots to logarithmic scale.
LOGAMPT	- Sets the Y-axis for time domain plots to logarithmic scale.
LOGFREQ	- Sets the X-axis for frequency domain plots to logarithmic scale.
LOGTIME	- Sets the X-axis for time domain plots to logarithmic scale.
PAWS	(Every/Page/Never) - Sets the pause type. *Every* puts the program into the pause menu after every plot. *Page* puts the program into the pause menu after a multiple set of plots has plotted. *Never* does not put the program into the pause menu. The pause menu contains several features and is shown in Figure 3-2 and is accessed when the *PAWS* command is set to either *Every or Page*. From this menu and using the cursor controls one can adjust the location and size of an on the plot, spawn a *tall or wide* laser plot. When placing a message on a plot using one of the pause menu options (8 to 12) **the message must be in quotes.**
PLTYPE	(Real/Imag/Mag/Phase) - Sets the Y-axis data mode when doing a nonsplit frequency type plot with SPLITFF = 'No'.
PLTYPEB	(Real/Imag/Mag/Phase) - Sets the Y-axis data mode for the second frequency plot when doing a split frequency plot.
SHADE	(Off=0/Under=1/Over=2, Shading Slant(Deg), Line Separation(cm)) -This command provides capabililty to shade above or below a curve. Up to five curves can be shaded and the shading is adjustable for each curve. This command consists of three arguments; the first argument turns the shading feature on or off and determines if the shading is above or below the curve. If the shading feature is enabled the second argument determines the slant of the shading lines. Zero degrees would provide shading lines that are parallel to the x-axis, 90 degrees would shade the plot with lines parallel to the y-axis. The third argument determines the spacing between the shading lines in centimeters. If for example this argument is set to a small number (e.g. 0.1 cm) then the curve will appear to have a solid fill above or below the curve.
SINGLEPLOT	(line type(1-10), symbol #(1-11), symbol spacing(cm)) - Sets the characteristics for a single plot.

SPLITFF	(YesT/YesW/No) - Sets the FFP program to do a double frequency plot. In this case, the plot type (PLTYPE and PLTYPEB) must be set for each plot. In the YesT mode, the viewport is split automatically into top/bottom, and in YesW mode, the viewport is split left/right. The plot title is centered over the plots. The minimum and maximum values for the plots must also be specified. The different parameter specifiers with a 'B' attached are used to specify the second frequency plot. This command is useful for doing magnitude and phase frequency plots on the same page.
SPLITTF	(Tall/Wide) - Sets the viewport partitioning for a time/frequency plot when using the TDFD command. The program takes the viewport defined by the VPORTSIZE command and divides it in half to place the two plots specified into the viewport given. The tall/wide refers to the way the viewport is divided, and not to the laserprinter page orientation.
SINGLE	- Sets the program to plot single plots rather than family.
SYMA	(Integer 0-11) Activated when the AUTOSYMBOL parameter is set to 1. This parameter then sets the order in which curves 1 to 5 in family plots automatically cycle through symbols as defined in Table 3-2. A curve with a '0' will not have a symbol for that curve. Placing a negative sign (i.e. -1) in front of the symbol number will fill in the symbol.
SYMB	(Integer 0-11) Activated when the AUTOSYMBOL parameter is set to 1. This parameter then sets the order in which curves 6 to 10 in family plots automatically cycle through symbols as defined in Table 3-2.
SYMBLANK	(1=yes, 0=no) - When enabled the symbol blanks out the line. Disabled the line is drawn through the symbol.
SYMBOLSIZE	(number (cm)) - Sets the size in centimeters for the symbols. This parameter defines the size for all symbols in a family plot.
SYMSPA	(Number(cm)) Activated when the AUTOSPACE parameter is set to 1. This parameter then sets the symbol spacing in centimeters for curves 1 to 5. For example setting SYMSPA to 1. 1.1 1.2 1.3 1.4 would set the symbol spacing of curve 1 to 1cm, curve 2 to 1.1cm, curve 3 to 1.2cm etc..
SYMSPB	(Number(cm)) Same as SYMSPA except for curves 6 to 10 of a family plot.
TICKEND	(Yes, No) - This command determines if the plot ends on a tick mark or not. When enabled (yes) the plot will always end on a tick mark.
TEXTURE	(Yes/No) - This command tells *SIG* to cycle between four different line types when plotting a normal *SIG* family plot.
TITLEF	(title) Family Plot Title - variable font, size, location. On plot titles, if the title is too long to fit on the plot with the font size defined with the TITLECHAR command, the plot package scales the title down to where it will fit within the plot boundaries.

TITLECHAR	(size, font) - Sets the size in centimeters and font (see Table 3-1) of the plot title.
TITLESHF	(Δx, Δy in cm) - Moves the plot title from its default position. A negative Δx moves the title to the left on the plotting surface. A negative Δy moves the title towards the bottom of the plotting surface.
TITLET	(title) - Sets the time domain family title. Multiple fonts, size, and superscript/subscripts are available, as well as control over position. If the size specified makes the title too large for the plot, the program will shrink the title size until it fits across the top of the plot. This is also the time domain title used when doing a time/freq plot.
TLASER	- Sets the graphics device to a tall laserprinter.
VIEWMOD	(Yes/No) - This command puts the package in VIEWGRAPH MODE, in which case the header is suppressed and the large viewgraph title set by VTITLE is put at the top of the page. This form is meant to work best on the laser in wide form. The logo is also moved to the appropriate position.
VPORTSIZE	(xmin,xmax,ymin,ymax) - Sets the overall viewport size for the plot surface. Values for the various parameters vary from 0 to 1 and correspond to a percentage of the screen.
VTITLE	(title) - Sets the viewgraph title (see VIEWMOD). The program automatically sizes and positions the characters. It should be noted that only 40 characters are allowed in the title, and no subscripts or font changes are permitted.
VT100	- Sets the graphics device to a DEC VT100.
VT240	- Sets the graphics device to a DEC VT240.
WLASER	- Sets the graphics device to a wide laser printer.
XAUTO	(Yes/No) - Sets the program to scale the X-axis to engineering units and automatically places the proper unit in front of the specified label. (see XUNITSF)
XLABCHAR	(size, font) - Sets the size in centimeters and font (see Table 3-1) of the x-axis label.
XLABF	(label) - Sets the X-axis label used in the frequency domain plots. This label is used by both plots when when doing a double frequency plot. Fonts and subscripts/superscripts may be used.
XLABSHF	(Δx, Δy in cm) - Moves the x-axis label from its default position. A negative Δx moves the label to the left on the plotting surface. A negative Δy moves the label towards the bottom of the plotting surface.
XLABT	(label) - A local *SIG* command to define the X-axis label for time domain plots. The font, size, and location of the label are defined using the XLABCHAR command or the BORDER menu. This function has superscript and subscript capability.
XMAXF	(number) - Sets the maximum X-axis frequency value plotted by the plot package. A '0' tells the program to auto-size.

XMAXT	(number) - Sets the maximum X-axis time value plotted by the plot package. A '0' tells the program to auto-size.
XMINF	(number) - Sets the minimum X-axis frequency value plotted by the plot package. A '0' tells the program to auto-size.
XMINT	(number) - Sets the minimum X-axis time value plotted by the plot package. A '0' tells the program to auto-size.
XUNITSF	(units) - Sets the X-axis frequency units used by the program when auto-engineering units is used (see XAUTO). An example of (units) would be 'Hertz'.
XUNITST	(units) - Sets the X-axis time units used by the program when the auto-engineering units is used (see XAUTO). An example of (units) would be 'sec'. This is the time domain units used when doing the time portion of a TDFD plot.
YAUTO	(Yes/No) - Sets the program to scale the Y-axis to engineering units and automatically places the proper unit in front of the specified label. See YUNITSF)
YLABCHAR	(size, font) - Sets the size in centimeters and font (see Table 3-1) of the y-axis label.
YLABF	(label) - Sets the Y-axis label used in the frequency domain plots. This is also the first plot label used when doing a double frequency plot. Fonts and subscripts/superscripts may be used.
YLABFB	(label) - Sets the second plot Y-axis label when using a double frequency domain plot. Fonts and subscripts/superscripts may be used.
YLABSHF	($\Delta x, \Delta y$ in cm) - Moves the y-axis label from its default position. A negative Δx moves the label to the left on the plotting surface. A negative Δy moves the label towards the bottom of the plotting surface.
YLABT	(label) - Sets the Y-axis time domain label. This label has font and size control defined using the YLABCHAR command or the BORDER menu.
YMAXF	(number) - Sets the maximum Y-axis value for frequency plots. A '0' tells the program to auto-scale.
YMAXFB	(number) - Sets the maximum Y-axis value of the second plot when doing a double frequency plot. A '0' tells the program to auto-scale. (See SPLITFF)
YMAXT	(number) - Sets the maximum Y-axis value for time plots. A '0' tells the program to auto-scale.
YMINF	(number) - Sets the minimum Y-axis value for frequency plots. A '0' tells the program to auto-scale.
YMINFB	(number) - Sets the minimum Y-axis value for the second plot of a double frequency plot. A '0' tells the program to auto-size. (see SPLITFF)
YMINT	(number) - Sets the minimum Y-axis value for time domain plots. A '0' tells the program to auto-size.

YTYPEB	(Lin/Log) - Sets the Y-axis scale for the second plot when doing a double frequency domain plot. This may be necessary to use when doing a phase plot to insure the axis type is not logarithmic.
YUNITSF	(units) - Sets the Y-axis frequency units used by the program when auto-engineering units are selected (see YAUTO). An example of (units) would be 'volts'.
YUNITSFB	(units) - This command is similar to YUNITSF, except that it is used to set the Y-axis units for the second frequency plot of a double frequency domain plot. (See SPLITFF).
YUNITST	(units) - Sets the Y-axis time domain units used by the program when the auto-engineering units are selected (see YAUTO). An example of (units) would be 'volts'. These are the time domain units used when doing the time portion of a TDFD plot.
3DCHAR	(Zdist($\geq$ 1.), Yrot(0°-360°), Xrot(0°-360°), 3Dopt(0, 1,or 3), Lineconnect(1=yes,0=no) - Defines the characteristics for the three-dimensional plot routines. Zdist is the distance to the observation point. This parameter has different effects depending on the values of Yrot and Xrot a vaulue of 3.0 is usually a good starting point; Yrot is the rotation of the Y-axis in degrees; Xrot is the degree of rotation X-axis; 3D-opt define the hidden line characteristics, 0 = draw all lines, 1 = supress all lines hidden by the surface but display both the top and bottom surface, 3 = suppress all lines hidden by the surface and all lines showing the bottom surface. Lineblank enabled will draw lines from one curve to the next forming a surface. Disabled the curves are drawn as individual curves with no intersecting lines.
ZLABF	(label) - A local *SIG* command to define the Z-axis label for frequency domain 3-D plots. This function has superscript and subscript capability.
ZLABT	(label)- A local *SIG* command to define the Z-axis label for time domain 3-D plots. This function has superscript and subscript capability.
ZUNITSF	(units) - Sets the Z-axis units for the 3-D frequency domain plots. Currently, this parameter is not employed by the program, although it must be defined as a dummy in the *SIG* parameter file.
ZUNITST	(units) - Sets the Z-axis units for the 3-D time domain plots. Currently, this parameter is not employed by the program, although is must be defined as a dummy in the *SIG* parameter file.

1. Continue
2. Quit Graphics
3. Set Location and Size of ICON1
4. Set Location and Size of ICON2
5. Set Location and Size of ICON3
6. Set Location and Size of ICON4
7. Set Location and Size of ICON5
8. Set Message Pointer #1 Location
9. Set Message Pointer #2 Location
10. Set Message Pointer #3 Location
11. Set Message Pointer #4 Location
12. Set Message Pointer #5 Location
13. Send current plot to Wide Laser
14. Send current plot to Tall Laser

Figure 3-2   Pause Menu for TFP, FFP and TDFD Routines

Chapter 4

DRAFTING

This utility program allows the user to draw pictures for placement on *SIG* fancy plots without having any knowledge of DIGLIB routines or FORTRAN. The user simply types the plot commands into a data file and define this file using the ICON commands. Up to five different objects may be plotted on a picture with the current capabilities. The plotting program allows the drafted object to be placed anywhere on the screen and sized. These changes are then saved to the local *SIG* parameter file during the pause after each plot. The current capabilities include:

1. Drawing a line
2. Drawing a box
3. Drawing a symbol
4. Drawing a smooth curve through a number of points
5. Filling in a area
6. Changing the line thickness
7. Placing an arrowhead at the end of a line
8. Drawing a circle or ellipse
9. Changing the line type
10. Moving the graphics pointer
11. Placing a string with a choice of size, font, and orientation

Each line of the vector file must contain an X, Y pair. The drawing surface is bounded by ± 1.0 in both X and Y directions. This allows easy scaling of coordinates to the screen. Several parameters described below may require a size to be included in the parameters. All commands in this drafting language have X values greater than one. If a line of the vector file is not part of a larger instruction, and the X value is less than or equal to 1.0, the program assumes a line is being drawn from the old pointer location to the point indicated. A drawing can be checked by executing ERD131::USER2_DISK:[HUDSON.SIG]DRAFTTEST. This program reads a given data file and draws the figure on a VT100 with Retrographics or QMS Laserprinter, with or without grid lines. The various commands are explained below and a sample listing and resulting picture are listed in Appendix C.

Draw Box command: This command draws a box and is followed by the coordinates of the lower left and upper right corners.

Format: 2.0,   *dummy*
$X_{LL},$ Y_{LL}
$X_{UR},$ Y_{UR}

(X_{UR}, Y_{UR})

(X_{LL}, Y_{LL})
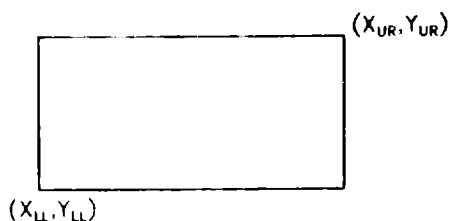
Draw Symbol command: This command puts a symbol of a given type and size at the given coordinates. The symbol numbers correspond to the symbols used by the fancy plotting program. X and Y are the center coordinates for the symbol. *S-size* is its height relative to a 2x2-cm square and *S-blank* blanks the area under the symbol when set to 1.

Format: 3.0,   *Symbol number*

        X, Y

        S-size,   *S-blank*

SYMBOL   5, NO BLANK

(X,Y)

Draw Smooth Curve command: This command draws a smooth curve through a set of points with monotonically increasing X-values. The interpolation factor *(I-factor)* indicates how tight the turns should be with higher interpolation factors drawing tighter turns. An *I-factor* of 1.0 has been found to work well.

Format: 4.0,   *Npoints*

        I-factor,   *dummy*

        X_1, Y_1

        X_2, Y_2

        ⋮

        X_n, Y_n

(X_2,Y_2) (X_4,Y_4)

(X_3,Y_3)
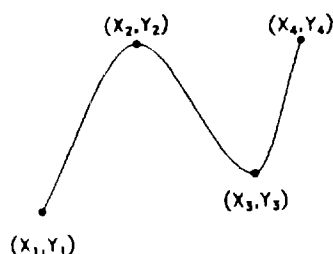
(X_1,Y_1)

Fill Area command: This command fills in an area defined by the given points. The points should bound the area in either a clockwise or counterclockwise rotation.

Format: 5.0,   *Npoints*

        X_1, Y_1

        X_2, Y_2

        ⋮

        X_n, Y_n

(X_2,Y_2) (X_4,Y_4)

(X_3,Y_3)

(X_1,Y_1)

(X_5,Y_5)

(X_6,Y_6)
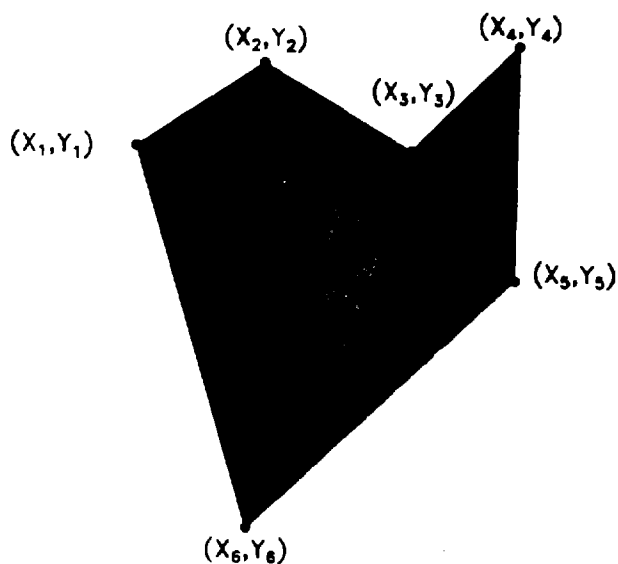
Change Line Thickness command: This command changes the thickness of the drawn lines. The dimension is equivalent to that used for the Fancy Plots. These thicker lines will only be drawn when a plot is sent to the laser printer. The thickness also carries over to the character strings and may be used to draw bolder lettering.

Format: 6.0,   *Line thickness*

Draw Arrowhead command: This command draws an arrowhead at the end of the last line drawn. The Y value of this command indicates the size of the sides of the arrowhead relative to a 2x2-cm square. A side length of 0.05 is good.

Format: X_{Start}, Y_{Start}
 X_{Stop}, Y_{Stop}
 7.0,   *Side Length*

(X_{START}, Y_{START})

(X_{STOP}, Y_{STOP})
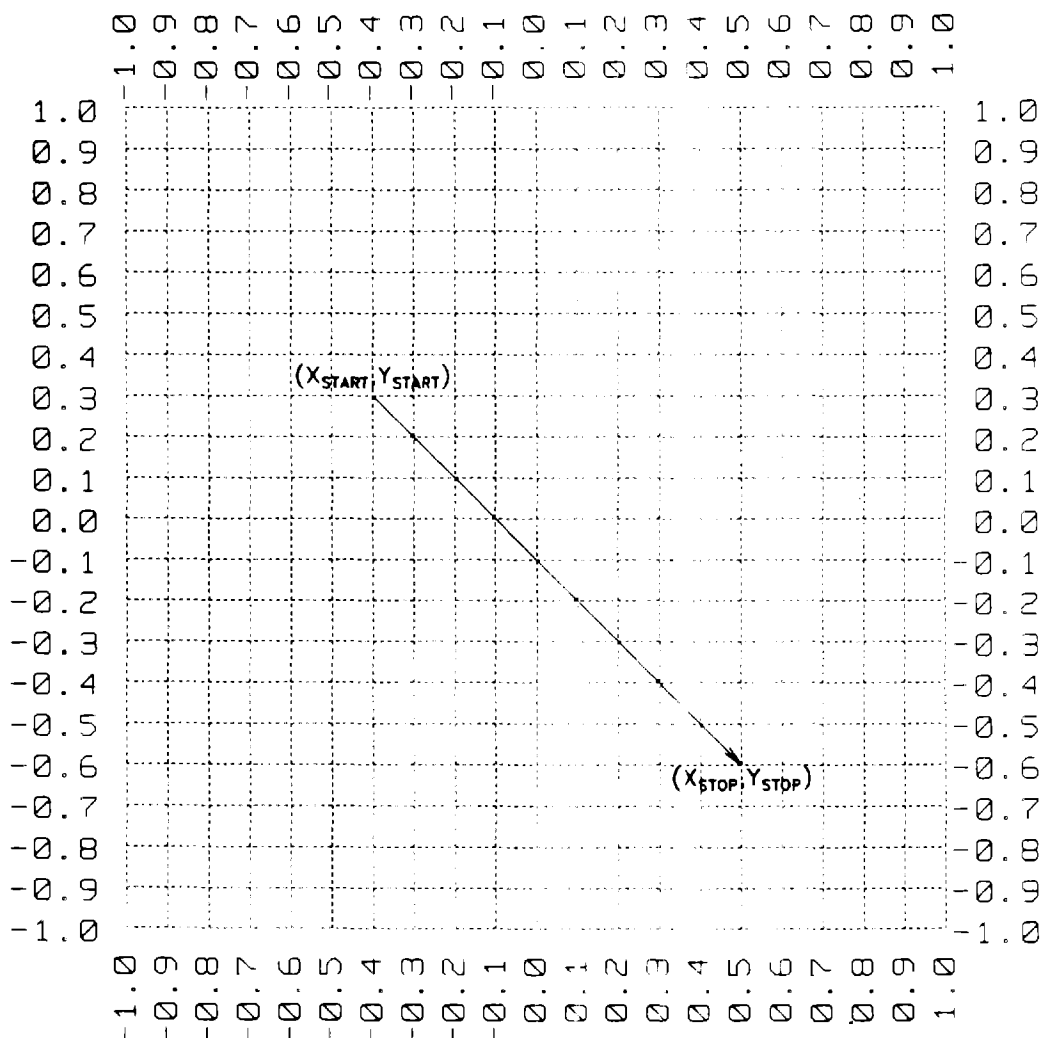
Draw Circle command: This command draws a circle or an ellipse. A circle is made by setting $X_{Aspect} = Y_{Aspect}$. Setting $X_{Aspect} = Y_{Aspect} = 1.0$ will result in a circle of the given radius. The start and stop angles (in degrees) are entered so that apertures can be indicated. The angles used by this program are:

$$90$$

$$180 \longrightarrow 0$$

$$270$$

These angles must be entered in an increasing order. For example, to plot a circle that starts at some given angle and wraps around past the X-axis, add 360 to the stop angle to get Θ_{stop}.

Format: 8.0,   _dummy_
$X_{Center},$ Y_{Center}
Radius, _dummy_
$X_{Aspect},$ Y_{Aspect}
$\Theta_{Start},$ Θ_{Stop}

Change Line Type command: This command changes the line type being drawn. The line type numbers are the same as used for the fancy plot program.
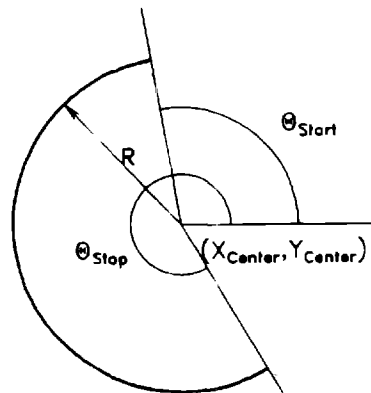
Format: 9.0,   _Line Type Number_

Move command: The Move command moves to the point indicated by the next line of the vector file without drawing a line. This is a pen up move.

Format: 10.0,   _dummy_
$X_{Stop},$ Y_{Stop}

Write String command: This command draws text onto the figure. It is also used as a terminator for the vector file. A _Flag_= 1.0 indicates that strings are to be drawn and _Flag_= 0.0 indicates that there are no strings. Since this is the vector file terminator, all strings _must_ be placed at the end of the vector file. X_1 and Y_1 are the coordinates of the string position. The precise meaning of these coordinates is modified by _P-flag_ described below. _Size_ is how high the characters (not subscripts or superscripts) in the string are as related to the 1 x 1 grid described earlier. The rotation angle of the string is controlled by θ with increasing θ causing a clockwise rotation of the string. _Font_ determines the style of the characters used in the string. The various fonts are described at the beginning of chapter 4. The position flag _(P-flag)_ indicates that the text will be left-justified or centered. When _P-flag_= 0.0, X and Y indicate the location of the lower left corner of the character string. When _P-flag_= 5.0, X and Y indicate the baseline center point of the string. Also, a single line of entered text can be broken into multiple lines on the plot by putting an asterisk ($*$) where the line should be broken. The portion of the string after

the (*) will be placed under the preceding portion. This feature is useful when making block diagrams and long strings have to fit in a box. On the next line the desired string is placed. This "string" has all the features (i.e. 'superscripts', 'subscripts' etc.) described at the beginning of Chapter 4.

Format: 14.0,   *Flag*

X_1, Y_1

$Size_1$, θ_1

$Font_1$, *P-flag*

$String_1$

X_2, Y_2

$Size_2$, θ_2

$Font_2$, *P-flag*

$String_2$

$\vdots$

X_n, Y_n

$Size_n$, θ_n

$Font_n$, *P-flag*

$String_n$

Appendix A

SAMPLE SIG COMMAND FILE

! This is a SIG command file to generate useful commands for the fancyplot package.
!
! Definitions
!

scdef DOMAIN	pfw FSP.DOMAIN	*!Define 'continuous' or 'discree't freq. plots*
scdef FAMILY	pfw PLOT.MPMODE FAMILY	*!Plot overlays*
scdef FFP	prog [HUDSON.SIG]FFP ffp	*!Fancy Freq. Plot*
scdef FZERO	pfw FSP.FZERO	*!Plot DC term, Yes or No*
scdef GRID	pfw PLOT.GRID	*!Grid type; FULL or TICK*
scdef HEADER	pfw PLOT.HEADER	*!Header on FFP, TFP, or 3DFFP (Y/N)*
scdef ICON1	pfw PLOT.DRFT1	*!Filename for 1st figure*
scdef ICON2	pfw PLOT.DRFT2	*!Filename for 2nd figure*
scdef ICON3	pfw PLOT.DRFT3	*!Filename for 3rd figure*
scdef ICON4	pfw PLOT.DRFT4	*!Filename for 4th figure*
scdef ICON5	pfw PLOT.DRFT5	*!Filename for 5th figure*
scdef LEG1	prog [HUDSON.SIG]LEGPARAMF PLOT.LEG1	*!Set legend 1 label*
scdef LEG2	prog [HUDSON.SIG]LEGPARAMF PLOT.LEG2	*!Set legend 2 label*
scdef LEG3	prog [HUDSON.SIG]LEGPARAMF PLOT.LEG3	*!Set legend 3 label*
scdef LEG4	prog [HUDSON.SIG]LEGPARAMF PLOT.LEG4	*!Set legend 4 label*
scdef LEG5	prog [HUDSON.SIG]LEGPARAMF PLOT.LEG5	*!Set legend 5 label*
scdef LEG6	prog [HUDSON.SIG]LEGPARAMF PLOT.LEG6	*!Set legend 6 label*
scdef LEG7	prog [HUDSON.SIG]LEGPARAMF PLOT.LEG7	*!Set legend 7 label*
scdef LEG8	prog [HUDSON.SIG]LEGPARAMF PLOT.LEG8	*!Set legend 8 label*
scdef LEG9	prog [HUDSON.SIG]LEGPARAMF PLOT.LEG9	*!Set legend 9 label*
scdef LEG10	prog [HUDSON.SIG]LEGPARAMF PLOT.LEG10	*!Set legend 10 label*
scdef LINAMP	pfw FSP.YTYPE LIN	*!Lin. amplitude for FS plots*
scdef LINAMPT	pfw TSP.YTYPE LIN	*!Lin. amplitude for TS plots*
scdef LINFREQ	pfw FSP.XTYPE LIN	*!Linear frequency axis*
scdef LINTIME	pfw TSP.XTYPE LIN	*!Linear time axis*
scdef LOGAMP	pfw FSP.YTYPE LOG	*!Log. amplitude for FS plots*
scdef LOGAMPT	pfw TSP.YTYPE LOG	*!Log. amplitude for TS plots*
scdef LOGFREQ	pfw FSP.XTYPE LOG	*!Log. frequency axis*
scdef LOGTIME	pfw TSP.XTYPE LOG	*!Logarithmic time axis*
scdef NXTPLT	pfw PLOT.NVPORT	*!Next VIEWPORT to plot*
scdef PAWS	pfw PLOT.PAUSE	*!Pause: Every,Never,Page*
scdef PLOT	sys TY SYS$LOGIN:PLOTIN.DAT	*!Put VT240 into 4010 mode*
scdef PLTYPE	pfw FSP.TYPE	*!Rea, Ima, Mag, or Pha*
scdef PLTYPEB	pfw FSP.OPTB	*!Rea, Ima, Mag, or Pha*
scdef SINGLE	pfw PLOT.MPMODE SINGLE	*!Plot single plots*
scdef SPLITFF	pfw PLOT.2TYP	*!No, YesT, YesW*
scdef SPLITTF	pfw PLOT.FFT	*!Tall, Wide*
scdef TDFD	prog [HUDSON.SIG]TDFD TDFD	*!Plot Time and Freq.*
scdef TEK	pfw DEVICE.PLOT 4027	*!TEK 4027 plotter*
scdef TEXT	sys TY SYS$LOGIN:PLOTOUT.DAT	*!Put VT240 into text mode*
scdef EXTURE	pfw PLOT.TEXTURE	*!Texture on FAMILY (Y/N)*
scdef TFP	prog [HUDSON.SIG]TFP tfp	*!Fancy Time Plots*
scdef TITLEF	PLOT.FAMTITLF	*!Set title for FAMILY*
scdef TITLET	PLOT.FAMTITLT	*!Set title for FAMILY*
scdef TLASER	pfw DEVICE.PLOT TLASER	*!Tall Laserplotter*

```
scdef TREND      prog [LUDWIGSEN.SIGPRGMS]TREND trend    !FS smoother
scdef VIEWMOD    pfw VIEW.MODE                           !Make Viewgraph
scdef VPORTS     pfw PLOT.VPNAME                         !VIEWPORTS (i.e. 1X1)
scdef VT100      pfw DEVICE.PLOT VT100                   !Plot on VT100 screen
scdef VT240      pfw DEVICE.PLOT VT240                   !Plot on VT240 screen
scdef WLASER     pfw DEVICE.PLOT WLASER                  !Wide Laserplotter
scdef XLABF      prog [HUDSON.SIG]PARSECHK PLOT.XLABELF  !Set x-axis label
scdef XAUTO      pfw PLOT.ENGX                           !Auto Scale X-axis (Y/N)
scdef XLABT      prog [HUDSON.SIG]PARSECHK PLOT.XLABELT  !Set x-axis label
scdef XMAXF      pfw FSP.XMAX                            !Set max. freq. for plots
scdef XMAXT      pfw TSP.XMAX                            !Set max. time for plots
scdef XMINF      pfw FSP.XMIN                            !Set min. freq. for plots
scdef XMINT      pfw TSP.XMIN                            !Set min. time for plots
scdef XUNITSF    pfw PLOT.XUNITSF                        !Set x-axis label units
scdef XUNITST    pfw PLOT.XUNITST                        !Set x-axis label units
scdef YAUTO      pfw PLOT.ENGY                           !Auto Scale Y-axis (Y/N)
scdef YLABF      prog [HUDSON.SIG]PARSECHK PLOT.YLABELF  !Set y-axis label
scdef YLABFB     prog [HUDSON.SIG]PARSECHK PLOT.YLABELFB !Set 2nd y-axis label
scdef YLABT      prog [HUDSON.SIG]PARSECHK PLOT.YLABELT  !Set y-axis label
scdef YMAXF      pfw FSP.YMAX                            !Set FSP max. amplitude
scdef YMAXFB     pfw FSP.YMAXB                           !Set split FSP max. amp.
scdef YMAXT      pfw TSP.YMAX                            !Set TSP max. amplitude
scdef YMINF      pfw FSP.YMIN                            !Set FSP min. amplitude
scdef YMINFB     pfw FSP.YMINB                           !Set split FSP min. amp.
scdef YMINT      pfw TSP.YMIN                            !Set TSP min. amplitude
scdef YUNITSF    pfw PLOT.YUNITSF                        !Set y-axis label units
scdef YUNITSFB   pfw PLOT.YUNITSFB                       !Set 2nd y-label units
scdef YUNITST    pfw PLOT.YUNITST                        !Set y-axis label units
scdef 3DFFP      prog [HUDSON.SIG]3DFFP 3DFFP            !3-D fancy plots
scdef ZLABF      prog [HUDSON.SIG]PARSECHK PLOT.ZLABELF  !Set z-axis label
scdef ZLABT      prog [HUDSON.SIG]PARSECHK PLOT.ZLABELT  !Set z-axis label
scdef ZUNITSF    pfw PLOT.ZUNITSF                        !Set Z-axis label units
scdef ZUNITST    pfw PLOT.ZUNITST                        !Set Z-axis label units
!
! Set the default conditions.
! The user can alter these default conditions to suit.
!
DOMAIN continuous
FZERO no
GRID tick
HEADER yes
ICON1 ' '
ICON2 ' '
ICON3 ' '
ICON4 ' '
ICON5 ' '
LEG1 Legend 1
LEG2 Legend 2
LEG3 Legend 3
LEG4 Legend 4
LEG5 Legend 5
LEG6 Legend 6
LEG7 Legend 7
```

LEG8 Legend 8
LEG9 Legend 9
LEG10 Legend 10
LINAMP
LINAMPT
LINFREQ
LINTIME
NXTPLT 1
PAWS never
PFW FILE1.DRF 0.8, 0.8, 0.1
PFW FILE2.DRF 0.8, 0.7, 0.1
PFW FILE3.DRF 0.8, 0.6, 0.1
PFW FILE4.DRF 0.8, 0.5, 0.1
PFW FILE5.DRF 0.8, 0.4, 0.1
PLTYPE mag
SINGLE
SPLITFF no
SPLITTF tall
TEXTURE no
TITLEF Frequency Family Title
TITLET Time Family Title
VIEWMOD no
VPORTS 1X1
TITLE Viewgraph Title
VT100
XLABF Frequency
XAUTO yes
XLABT Time
XMAXF 0
XMAXT 0
XMINF 0
XMINT 0
XUNITSF Hz
XUNITST sec
YAUTO no
YLABF Ylabel
YLABFB 2nd Ylabel
YLABT Ylabel
YMAXF 0
YMAXFB 0
YMAXT 0
YMINF 0
YMINFB 0
YMINT 0
YUNITSF Yunits
YUNITSFB 2nd Yunits
YUNITST Yunits
ZLABF Zlabel
ZLABT Zlabel
ZUNITSF Zunits
ZUNITST Zunits

Appendix B

TABLE OF SIG PARAMETER KEYS USED IN FANCY PLOT PROGRAMS

Program needs PFwrite	FFP	TFP	TDFD	3DTFP	3DFFP	Permissable Values
Device.Plot	•	•	•	•	•	4027, VT100, VT240, Wlaser, *or* Tlaser
FILE1.→5.Drf5	•	•	•	•	•	*Filename*
FSP.DOMAIN	•		•		•	Continuous *or* Discrete
FSP.Fzero	•		•		•	Yes *or* No
FSP.Type	•		•			Rea, Ima, Mag, *or* Pha
FSP.OptB	•		•			Rea, Ima, Mag, *or* Pha
FSP.Xmax	•		•		•	*Number*
FSP.Xmin	•		•		•	*Number*
FSP.Xtype	•		•			Lin *or* Log
FSP.Ymax	•		•		•	*Number*
FSP.YmaxB	•		•			*Number*
FSP.Ymin	•		•		•	*Number*
FSP.YminB	•		•			*Number*
FSP.Ytype	•		•			Lin *or* Log
FSP.YtypeB	•					Lin *or* Log
Plot.Autoline	•	•	•			1=yes, 0=no
Plot.Autospace	•	•	•			1=yes, 0=no
Plot.Autosymbol	•	•	•			1=yes, 0=no
Plot.Axisnmchr	•	•	•	•	•	Axis # size, Axis # font
Plot.Border	•	•	•			R-bord(1/0),T-bord(1/0), Thickness(1-10)
Plot.Drft1→.Drft5	•	•	•	•	•	*Filename*
Plot.EngX	•	•	•	•	•	Yes *or* No
Plot.EngY	•	•	•	•	•	Yes *or* No
Plot.FamTitlf	•		•		•	*Text*
Plot.FamTitlt		•	•	•		*Text*
Plot.FFT			•			Tall *or* Wide
Plot.Grid	•	•	•			Full *or* Tick
Plot.Header	•	•	•	•	•	Yes *or* No
Plot.legfont	•	•	•			*Font number*
Plot.Leg1→.Leg10	•	•	•	•	•	*Text*
Plot.linewidth	•	•	•			1 to 9
Plot.logo	•	•	•	•	•	1=yes, 0=no
Plot.logosize	•	•	•	•	•	Size in cm
Plot.ltypeseqA	•	•	•			LT1,LT2,LT3,LT4,LT5
Plot.ltypeseqB	•	•	•			LT6,LT7,LT8,LT9,LT10
Plot.MPmode	•	•	•			Family *or* Single
Plot.NVport	•	•	•	•	•	1, 2, 3,...
Plot.Pause	•	•	•	•	•	Never, Page, *or* Every
Plot.Pointer1a→5a	•	•	•			'string', rotation angle, size
Plot.Pointer1b→5b	•	•	•			message arrow coordinates
Plot.singlechr	•	•	•			linetype(0-10),symbol type(0-11),symbol spacing(cm)
Plot.symblank	•	•	•			Symbol Blanking(1=yes,0=no)
Plot.symseqA	•	•	•			Symbol order; sy1,sy2,sy3,sy4,sy5
Plot.symseqB	•	•	•			Symbol order;sy6,sy7,sy8,sy9,sy10
Plot.symsize	•	•	•			Symbol size in centimeters
Plot.symspseqA	•	•	•			Symbol spacing; sp1,sp2,sp3,sp4,sp5
Plot.symspseqB	•	•	•			Symbol spacing; sp6,sp7,sp8,sp9,sp10
Plot.titleshf	•	•	•	•	•	$\Delta x, \Delta y$ in cm
Plot.titlechr	•	•	•	•	•	Title size(cm),font
Plot.VPName	•	•	•	•	•	1X1, 2X1, 1X2, *etc.*
Plot.viewport	•	•	•	•	•	xmin,xmax,ymin,ymax (0 to 100%)
Plot.XlabelF	•		•		•	*Text*
Plot.XlabelT		•	•	•		*Text*
Plot.XtitleCHR	•	•	•			X label size(cm), font
Plot.XtitleSHF	•	•	•			$\Delta x, \Delta y$ in cm
Plot.XunitsF	•		•		•	*Text*
Plot.XunitsT		•	•	•		*Text*
Plot.YlabelF	•		•		•	*Text*
Plot.YlabelFB	•					*Text*
Plot.YlabelT		•	•	•		*Text*
Plot.YtitleCHR	•	•	•			Y label size(cm), font
Plot.YtitleSHF	•	•	•			$\Delta x, \Delta y$ in cm

Program needs PFwrite	FFP	TFP	TDFD	3DTFP	3DFFP	Permissable Values
Plot.YunitsF	•		•		•	*Text*
Plot.YunitsFB	•					*Text*
Plot.YunitsT		•	•	•		*Text*
Plot.3dim			•		•	Zdist,Xrotation,Yrotation, 3D-opt,Lineblanking
Plot.ZlabelF					•	*Text*
Plot.ZlabelT				•		*Text*
Plot.ZunitsF					•	*Text*
Plot.ZunitsT				•		*Text*
Plot.2Typ	•					YesT, YesW, *or* No
TSP.Xmax		•	•	•		*Number*
TSP.Xmin		•	•	•		*Number*
TSP.Xtype		•	•			Lin *or* Log
TSP.Ymax		•	•	•		*Number*
TSP.Ymin		•	•	•		*Number*
TSP.Ytype		•	•			Lin *or* Log
View.Mode	•	•	•	•	•	Yes *or* No
View.Title	•	•	•	•	•	*Text*

Appendix C

SAMPLE VECTOR FILE FOR PLUTO FIGURE

```
1   10.0,     0.0  ;Draw PLUTO's left side       14  10.0,      0.0  ;Draw Aperture title arrow
    -0.23,    0.7                                     -0.52,    -0.25
    -0.23,   -0.45                                    -0.23,    -0.5
2   10.0,     0.0  ;Draw PLUTO's right side           7.0,      0.1
    0.23,     0.7                                 15  10.0,      0.0  ;Draw Plug title arrow
    0.23,    -0.5                                      -0.4,     0.32
3   10.0,     0.0  ;Draw side of aperture             -0.23,    0.21
    -0.19,   -0.53                                16  9.0,       2.0  ;Change line type to dashed
    -0.19,   -0.49                                17  10.0,      0.0  ;Draw hidden plug title arrow
4   8.0,      0.0  ;Draw top of PLUTO                 -0.23,    0.21
    0.0,      0.7                                      -0.13,    0.0
    0.23,     0.0                                      7.0,      0.1
    1.0,      0.25                                18  10.0,      0.0  ;Draw hidden wire
    0.0,      360.0                                    0.0,     -0.5
5   10.0,     0.0  ;Draw PLUTO height tick             0.0,      0.0
    0.28,     0.7                                 19  10.0,      0.0  ;Draw hidden aperture side
    0.65,     0.7                                      -0.13,   -0.45
6   10.0,     0.0  ;Draw PLUTO base tick               -0.13,   -0.41
    0.28,    -0.5                                 20  8.0,       2.0  ;Draw plug top
    0.65,    -0.5                                      0.0,      0.42
7   10.0,     0.0  ;Draw cavity height tick            0.23,     0.0
    0.3,      0.0                                      1.0,      0.25
    0.45,     0.0                                      0.0,      360.0
8   10.0,     0.0  ;Draw cavity height arrow       21  8.0,       0.0  ;Draw plug bottom
    0.35,    -0.2                                      0.0,      0.0
    0.35,     0.0                                      0.23,     0.0
    7.0,      0.1                                      1.0,      0.25
9   10.0,     0.0  ;Draw cavity base arrow             0.0,      360.0
    0.35,    -0.32                                22  8.0,       0.0  ;Draw hidden PLUTO bottom
    0.35,    -0.5                                      0.0,     -0.5
    7.0,      0.1                                      0.23,     0.0
10  10.0,     0.0  ;Draw top radius ticks              1.0,      0.25
    -0.23,    0.8                                      0.0,      125.0
    -0.23,    0.9                                 23  8.0,       0.0  ;Draw hidden part of aperture top
11  10.0,     0.0                                      0.0,     -0.45
    0.23,     0.8                                      0.23,     0.0
    0.23,     0.9                                      1.0,      0.25
12  10.0,     0.0  ;Draw radius left arrow             125.0,    180.0
    -0.11,    0.85                                24  9.0,       1.0  ;Change to solid line type
    -0.23,    0.85                                25  8.0,       0.0  ;Draw bottom of PLUTO
    7.0,      0.1                                      0.0,     -0.5
13  10.0,     0.0  ;Draw radius right arrow            0.23,     0.0
    0.11,     0.85                                      1.0,      0.25
    0.23,     0.85                                      215.0,    360.0
    7.0,      0.1                                 33  -1.8,     -0.1  ;Label aperture size
26  8.0,      0.0  ;Draw top of aperture              0.1,      0.0
    0.0,     -0.45                                     4.0,      0.0
    0.23,     0.0                                      12.5x1.25 cm
    1.0,      0.25                                34  -1.8,     -0.24 ;Label next aperture size
    180.0,    220.0,                                   0.1,      0.0
27  10.0,     0.0  ;Draw Pluto base arrow              4.0,      0.0
    0.55,     0.15                                      3.125x.3125 cm
    0.55,    -0.5                                 35  0.45,      0.18 ;Label PLUTO height
    7.0,      0.1
```

```
28  10.0,     0.0   ;Draw PLUTO height arrow        0 065,    0.0
     0.55,    0.35                                    5.0,     0.0
     0.55,    0.7                                  1 m
     7.0,     0.1                           36  -0.18,    0.89  ,Label PLUTO diameter
29  14.0,     1.0   ;END and draw labels             0.065,    0.0
30  -0.6,    -0.9   ;Label PLUTO                      5.0,     0.0
     0.1,     0.0                                  20 cm
     4.0,     0.0                           37   0.27,   -0.3   ;Label cavity height
    PLUTO                                           0.065,    0 0
31  -1.1,     0.3   ;Label plug                       5 0,     0 0
     0.1,     0.0                                  30 cm
     4.0,     0.0
    PLUG
32  -1.8,     0.1   ;Label aperture
     0.1,     0.0
     1.0,     0.0

    Aperture
```
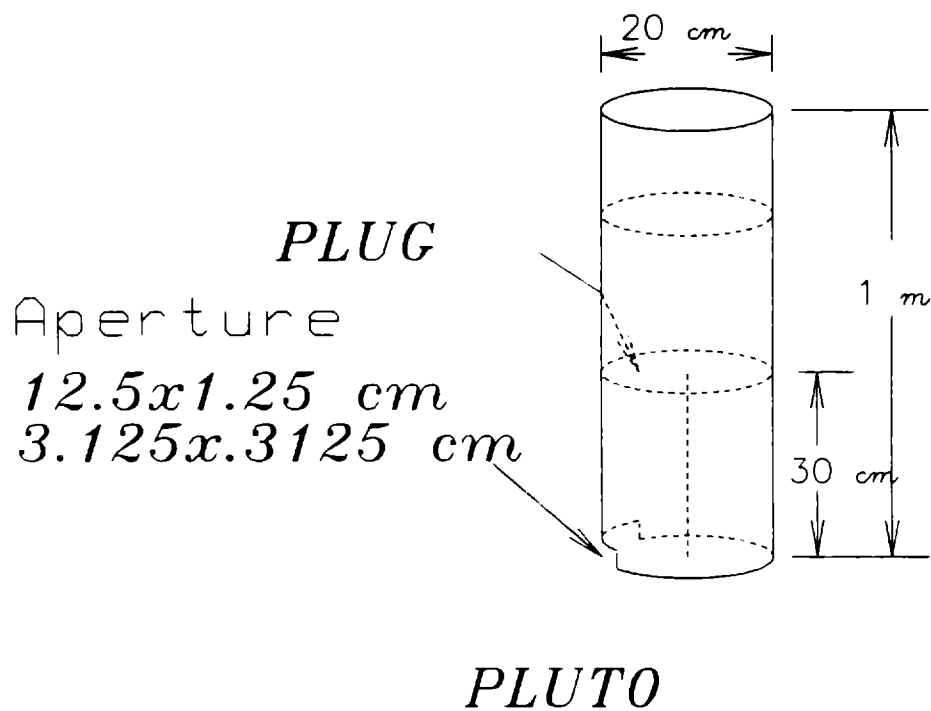

Figure C-1   Figure produced by above Draft File

Appendix D

ASSOCIATED FANCY PLOT PACKAGE PROGRAMS

DRAFTTEST: This program allows the user to examine the figure produced by the drafting package. It can produce a drawing on either a VT100 or Tall Laserprinter, with or without grid lines. The size of the examined display can also be adjusted.

FFP: This program draws fancy frequency domain plots.

FFPL: (.EXE and .COM) These programs are used to spawn laser plots from the terminal display of a fancy frequency plot.

LEGPARAMF: This program interpretes the legend labels and puts them in the local *SIG* parameter file.

PARSECHK: This program interpretes the title and X-, Y-, and Z-axis labels and puts them in the local *SIG* parameter file.

PARSER: This program tests a fancy plot string by displaying it on the screen.

PARSER2: This program is used by PARSECHK

TDFD: This program draws fancy time and frequency domain plots on the same page.

TFP: This program draws fancy time domain plots.

3DFFP: This program draws fancy three-dimension frequency domain plots.

3DTFP: This program draws a fancy three-dimension time domain plot.

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